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D3.14 High level implementation guide line for voluntary RED opt-in, per selected Member State, based on the existing system and Dutch blue print

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Executive summary

Sustainable aviation fuels is currently, and for the years to come, more expensive than fossil jet fuels. This price gap is one of the main reasons for the limited activity in supply-chain development. Due to the price sensitivity of the aviation industry, airlines are not able to pay more for their fuel. A mechanism to cover the price premium on the short term, should therefore be developed.

An opportunity to cover part of the price premium emerged within the European Union's Renewable Energy Directive (RED). The voluntary inclusion of SAF in the RED obligation is a mechanism implemented into legislation in The Netherlands since 2013. From 2016 onwards it will be possible for other member states to facilitate this as well, due to a change in the RED and Fuel Quality Directive (FQD) under the recent ILUC amendment:
"In the case of suppliers of biofuels in aviation, Member States may permit such suppliers to choose to become contributors to the reduction obligation provided that those biofuels comply with the sustainability criteria" – Directive 2015/153 amending FQD (98/70/EC) and the RED (2009/28/EC).

As all member states have implemented the RED differently, not all member states will have the same opportunities of implementing the voluntary aviation opt-in. In the ITAKA project D3.13 the member states with the highest potential to implement the aviation opt-in were shown.

For this report, SkyNRG got involved with the member states with the highest potential. A detailed outline to include the opt-in under their RED legislation was created for these category two member states: Ireland, Italy, Portugal, Spain, United Kingdom.

For the countries in category three: France, Sweden, Germany and Belgium, initial involvement with local political organisations and industry players have taken place to inform them about the potential of the aviation opt-in. The potential of the aviation opt-in and the results of this report are discussed with Boeing, Airport and IATA. This report can therefore be seen as a status update on these member states, as changing legislation is ongoing and more high-level discussions are needed before the wider implementation of the aviation opt-in can be realised.

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Abbreviations

ASTM	American Society for Testing and Materials
BOS	Biofuel Obligation Scheme
CIC	Certificates of Immission into Consumption
CNMC	Comisión Nacional de los Mercados y la Competencia
CO_2	Carbon Dioxide
EC	European Commission
ENMC	Entidade Nacional Para O Mercado de Combustiveis
EU	European Union
FQD	Fuel Quality Directive
GHG	Green House Gas
GSE	Gestore Servizi Eneregetici
HBE	Hernieuwbare Energie Eenheid (Renewable Energy Certificates)
HEFA	Hydrotreated Esters and Fatty Acids
ILUC	Indirect Land Use Change
KLM	Koninklijke Luchtvaart Maatschappij
MS	Member State
NEA	Nederlandse Emissie Autoriteit (Dutch Emission Authority)
NORA	National Oil Reserves Agency
PoS	Proof of Sustainability
RED	Renewable Energy Directive
RTFC	Renewable Transport Fuel Certificate
RTFO	Renewable Transport Fuel Obligation
SAF	Sustainable Aviation Fuels
TdB	Titulo de Biocombustivel
UCO	Used Cooking Oil

Definitions

N/A

Introduction

Sustainable aviation fuels is currently, and for the years to come, more expensive than fossil jet fuels. This price gap is one of the main reasons for the limited activity in supply-chain development. Due to the price sensitivity of the aviation industry, airlines are not able to pay more for their fuel. A mechanism to cover the price premium on the short term, should therefore be developed.

An opportunity to cover part of the price premium emerged within the European Union's Renewable Energy Directive (RED). The voluntary inclusion of SAF in the RED obligation is a mechanism implemented into legislation in The Netherlands since 2013. From 2016 onwards it will be possible for other member states to facilitate this as well, due to a change in the RED and Fuel Quality Directive (FQD) under the recent ILUC amendment:

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As all member states have implemented the RED differently, not all member states will have the same opportunities of implementing the voluntary aviation opt-in. In the ITAKA project D3.13 the member states with the highest potential to implement the aviation opt-in were shown. For the member states with the high potential (category 2) we created a detailed outline to include the opt-in under the RED legislation.

The structure for each of the member states is similar. As each member state adopted the RED legislation differently, first the current obligation system for road transport is explained more in-depth. Also, as the aviation opt-in is part of the ILUC amendment, the window of opportunity of the ILUC implementation deadlines are provided. This is followed by a description of how the current certificate system works and which stakeholders are involved in the member state. The analysis is finalised with the explanation of how the aviation opt-in could work in the respective member state.

For the countries in category three, initial involvement with local political organisations and industry players have taken place to inform them about the potential of the aviation opt-in. This report can therefore be seen as a status update on these member states, as changing legislation is ongoing and more high-level discussions are needed before the wider implementation of the aviation opt-in can be realised.

1.1 RED aviation opt-in member state analysis – Spain

1.1.1 Obligation for road transport

Spain was already working with obligations before the RED legislation was established. However, Spain has currently a renewable energy source share in the road transport sector of 0.5%. This means Spain is behind schedule on reaching 10% in 2020. From January 2016 onwards, legislation changed to a general obligation for biofuels. Previously there were individual obligations for biofuels in petrol and diesel.

ILUC amendment

Nearly all of Spanish biofuel production and consumption is produced with the use of food and energy crops as a feedstock. Therefore, Spain was not in favour of the 7% cap on 'first generation' biofuels stated in the ILUC amendment. However, now the ILUC amendment is accepted and implemented by the EU, Spain needs to change their directive accordingly. This transposition of the ILUC amendment, is in hands of the Ministry of Industry, Energy and Tourism (MINETUR). They will establish a proposal for the advanced biofuel objective, with the help of a public consultation period in the summer of 2016, to establish legislation before the 6th of April 2017. Implementation starts in September 2017.

ILUC Implementation timeline		
Public consultation period	Final legislation	Implementation
Summer 2016	06-04-2017	01-09-2017

1.1.2 Certificate System

The obligation is verified in Spain with the use of certificates. In this certificate system obligated parties need to have certificates to show their compliance to the obligation. In Spain there are around 100 organisations obligated under the RED legislation, these can be categorized in one of three groups:

- Final fuel suppliers to the market
- a fuel retailer who has imported fuels
- a consumer who has imported fuels for own use

The Comisión Nacional de los Mercados y la Competencia (CNMC), issues and manages this system called SICBIOS. CNMC will control the (trading of) certificates while also acting as a control mechanism regarding the sustainability issues of the obligation. Figure 1 shows a schematic overview of how the certificates are generated in Spain. In the following this system is elaborated upon in more detail.

1. Statement of compliance (SoC) for each step in the supply-chain indicating that the mass balance rules and sustainability criteria have been met needs to be gathered by the certificate registrant.
2. A proof of supply to the end-user transport market needs to be shown to the CNMC by the registrant.
3. The obligated party is responsible to request for certificates, in order to do this, they have to hand over a set of documents regarding sustainability (as specified under sustainability). Including a verifier's audit report stating that the mass balance rules and sustainability criteria have been applied throughout the supply-chain
4. CNMC provides the obligated party with their requested amount of certificates

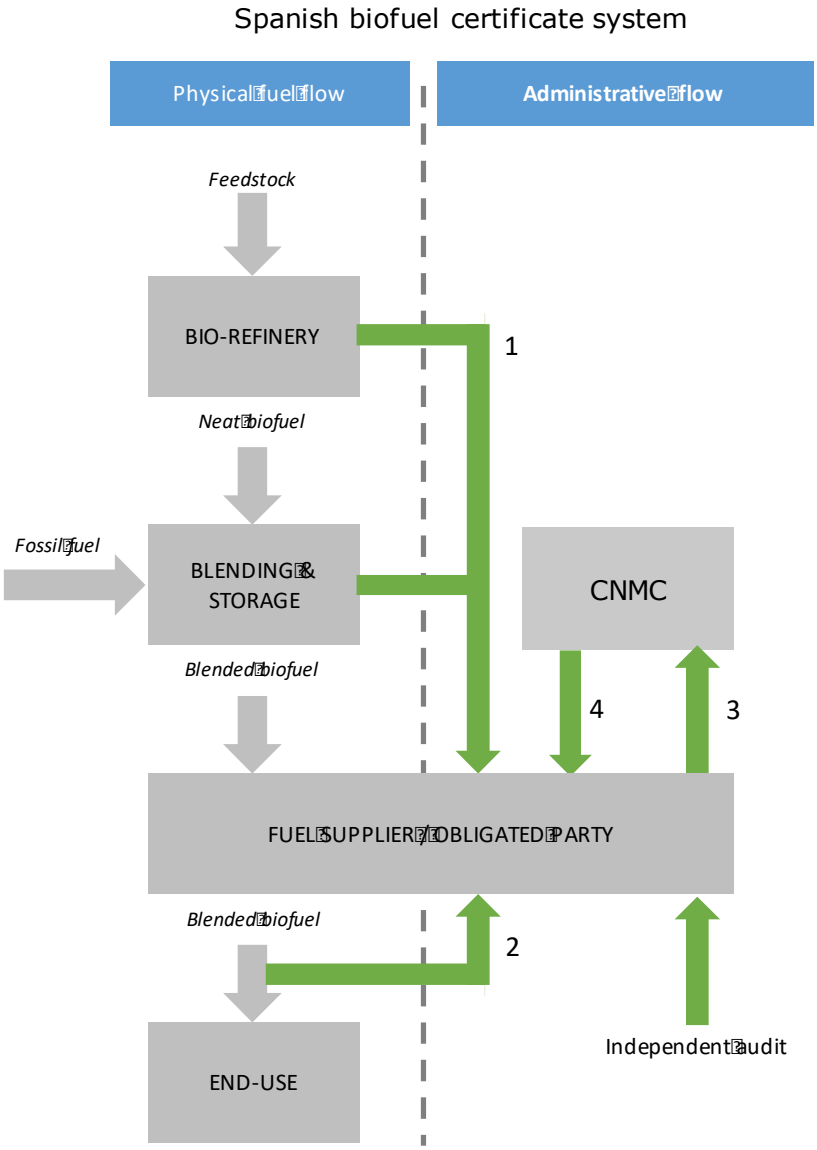

Figure 1. Schematic overview of the road transport biofuel certificate system in Spain

Sustainability criteria

Spain just recently changed its sustainability criteria, therefore both the old and new situations are briefly discussed.

Previous situation

From January 2013 to January 2016, a special period previous to the transition period for the verification of the sustainability of biofuels applied in Spain. This meant that sustainability criteria were only indicative and not binding for the certification of biofuels. However, it was mandatory to provide the information on, type of biofuel and raw material as well as the country of origin of the biofuel and the raw material.

Current situation

From January 2016, obligated companies must submit more detailed information and documentation. Furthermore, the three main criteria as stated in the EU RED legislation need to be fulfilled:

- To be considered sustainable, biofuels must achieve greenhouse gas savings of at least 35% in 2016, 50% in 2017 50% and 60% in 2018. All life cycle emissions are taken into account when calculating greenhouse gas savings. This includes emissions from cultivation, processing, and transport (i.e. the full supply-chain).
- Biofuels cannot be grown in areas converted from land with previously high carbon stock such as wetlands or forests.
- Biofuels cannot be produced from raw materials obtained from land with high biodiversity such as primary forests or highly biodiverse grasslands.

The certificate is only issued to the obligated organisations when they provide the following documents to the CNMC:

- Provide information on: batch, biofuel type, volume, feedstock and country of origin of raw material and biofuel.
- Demonstrate compliance with the three main sustainability criteria through one of the voluntary schemes recognized by the EC. These schemes can be for example the RSB or ISCC certification.

Value

One certificate is issued per tonne of oil equivalent (toe) of biofuel. On a monthly basis companies receive certificates, however only once a year the certificates are checked and made 'definitive', these definitive certificates are used to control whether the obligations are met. The all year-end is on the 21st of March, looking at the price history of certificates, certificates' worth is fluctuating substantially; ranging from €200 - to € 763,- per certificate (December 2014 and February 2014 respectively, equivalent to € 210,- to € 802,- per metric tonnes).

Special interest in Spain goes out to Biodiesel, for biodiesel to be certifiable, it must have been produced in a production plant that has been allocated an amount of biodiesel. Biodiesel will not be certified if it is produced in a plant that has not been assigned a quota or if the amount of biodiesel produced in a plant exceeds the assigned amounts. This system is however under revision and at the end of summer 2016 a decision to, change or stop with this system will be taken.
Contrasting to other member states, no double counting exists in Spain in the current legislation, together with the ILUC implementation this might change in the future.

A buy-out option is the final option for organisations to fulfil their obligation. However, it is not allowed to use the buy-out for their entire obligation. At least 50% needs to be fulfilled with actual certificates. After this the buy-out price is € 763 / certificate (toe biofuels). This means that this is also the maximum price certificates are traded for, as seen in February 2014. The money 'raised' in the buy-out fund is allocated among parties with surplus certificates. So a producer of biofuels who has a surplus of certificates and can't put them through to next year or sell them to another organisation, can receive a share of this fund.

Trading certificates

The certificates can be freely traded under the supervision of the CNMC, which registers transfers of certificates from one entity to another. There is no formally organised secondary market, thus transfers are arranged among organisations trough bilateral negotiations. This enables obligated organisations to fulfil their obligation by buying certificates instead of producing biofuels themselves.

An obligated party is allowed to comply up to a maximum of 30% of next year's obligation with certificates transferred from previous year.

1.1.3 Stakeholders

The stakeholders are discussed in three categories, first the responsible governmental organisations are discussed, followed by the biofuel industry. The last discussed category is the airline industry. In Figure 2, an overview of the stakeholders is provided. This is followed by an in-depth description of the stakeholders and its responsibilities.

Figure 2. Stakeholder overview Spanish biofuel industry

Government and Regulators

- The Ministry of Industry, Energy and Tourism (MINETUR) is the responsible ministry setting the biofuel obligation targets. MINETUR is also developing the legislation regarding biofuels in Spain and is therefore the body responsible for including the aviation opt-in.

- Under MINETUR, the Institution for the Diversification of Energy (IDEA) is responsible for the executing and creation of stimulating mechanisms to reach energy goals and targets. In this role IDEA is subsidizing new technologies and investigating new possibilities for more efficient use of energy. IDEA is also closely involved in developing new legislation for the biofuels.

- Where MINETUR and IDEA are creating the legislation, the Comisión Nacional de los Mercados y la Competencia (CNMC) is a governmental organisation, however acts independently as the national regulator for competition and is in the case of biofuels responsible to control the certificates through the Information System for Biofuels (SICBIOS).

- The Ministry of Agriculture, Food and Environment (MAGRAMA) is responsible for the Emission Trading Scheme (ETS) and Carbon Fund, not directly involved in the biofuel legislation, however very closely related. And this ministry will have a role regarding the ILUC implementation as their focus is on biodiversity, climate change and environmental quality.

Biofuel Industry

Feedstock

main feedstocks used in the Spanish Biofuel industry are the feedstocks used for Fatty Acids and Esters technologies (FAME) in biodiesel, such as: Palm Oil, UCO, Soy oil, animal fat, rapeseed, canola and sunflower oils. Olive pomace oil is a potential feedstock interesting for Spain and topic of some studies, however this is not in place yet. SkyNRG is investigating the possibilities of using this feedstock for setting up a regional supply-chain.

The companies involved in the feedstock area are:

- Bioplat - the Spanish biomass technology platform.
- Geregras - UCO managers and edible fats national association.
- Camelina company España - producer of camenila oil for the production of bio-jet.
- Grupo RAC - Brazilian company with section in Spain for UCO collection.
- Sacyr - Pomace Olive Oil producer.
-

Biofuel production industry

Due to the single quota mandate, which combines the biodiesel and bioethanol blending quotas, the fear existed that there would be an over-reliance on biodiesel from FAME facilities in Spain. Currently this does not seem to happen as the HVO/HEFA biofuels are all produced within Spain, only incidentally biofuel is imported.

The Association of Renewable Energy Companies (APPA) brings together all biomass as well as specific biofuel companies together. Some of the companies active in biofuel production are listed below. A complete overview of facilities and companies is in hands of SkyNRG but would be too extensive for this study.

- Abengoa – Large worldwide producer of biofuels as well as solar technolgoies
- Infinita Renovables – Biodiesel producer using FAME technology is part of Musim Mas and has two facilities in Spain.
- Iniciativas Bioenergéticas – Biodiesel producer using FAME technology
- Biocom Energia – Producer of advanced biodiesel from vegetable oils and animal fats.
- Ecomotion Biodiesel – Producer of biodiesel from rapeseed, with own crushing facility.
- Acciona Bunge – Biodiesel facility in Bilbao

Oil companies

The Spanish Association of Petroleum Products Operators (AOP), is the overarching organisation for petroleum products.

- Cepsa – Regular oil major, HVO producer
- Repsol – Regular oil major, HVO producer
- BP – Regular oil major, HVO producer

Aviation industry
Airports and Logistics

- SENASA - Airline association under the ministry of finance and administrative order
- AENA Group – organisation in which all airports in Spain are united
- OBSA - Observatory of Sustainability in Aviation (but directly connected with
- SENASA)
- AESA – State body ensures civil aviation standards in Spain.
- INTA – National Institute for Aerospace Technology (in EU Biofuels platform)

Airlines

- Iberia
- Vueling
- Pullmantur
- Air Europe

1.1.4 Possible voluntary opportunity to include Jet Fuel

In Figure 3 the Spanish opt-in is explained. The Spanish biofuel certificates are generated at the fuel supplier. The steps 1 – 4 can therefore be similar to the road transport sector. However, as the certificates are worthless for the jet fuel supplier, the certificates can be sold to the road transport fuel supplier. Therewith covering part of the price premium of SAF. In the following the steps are explained in more detail.

1. Statement of compliance (SoC) for each step in the supply-chain indicating that the mass balance rules and sustainability criteria have been met needs to be gathered by the certificate registrant.
2. A proof of supply to the end-user transport market needs to be shown to the CNMC by the registrant.
3. Besides their own proof of sustainability, the registrant also has to include a verifier's audit report stating that the mass balance rules and sustainability criteria have been applied throughout the supply-chain.
4. The certificate registrant can then request the certificates, in order to do this, they have to hand over the set of documents (step 1) regarding sustainability (as specified under sustainability
5. CNMC provides the obligated party with their requested amount of certificates
6. As the jet fuel supplier does not need the certificate for an obligation they sell them to the obligated party.
7. The road transport fuel supplier, the obligated party, hands over the certificates to the CNMC and therewith fulfils its obligation.

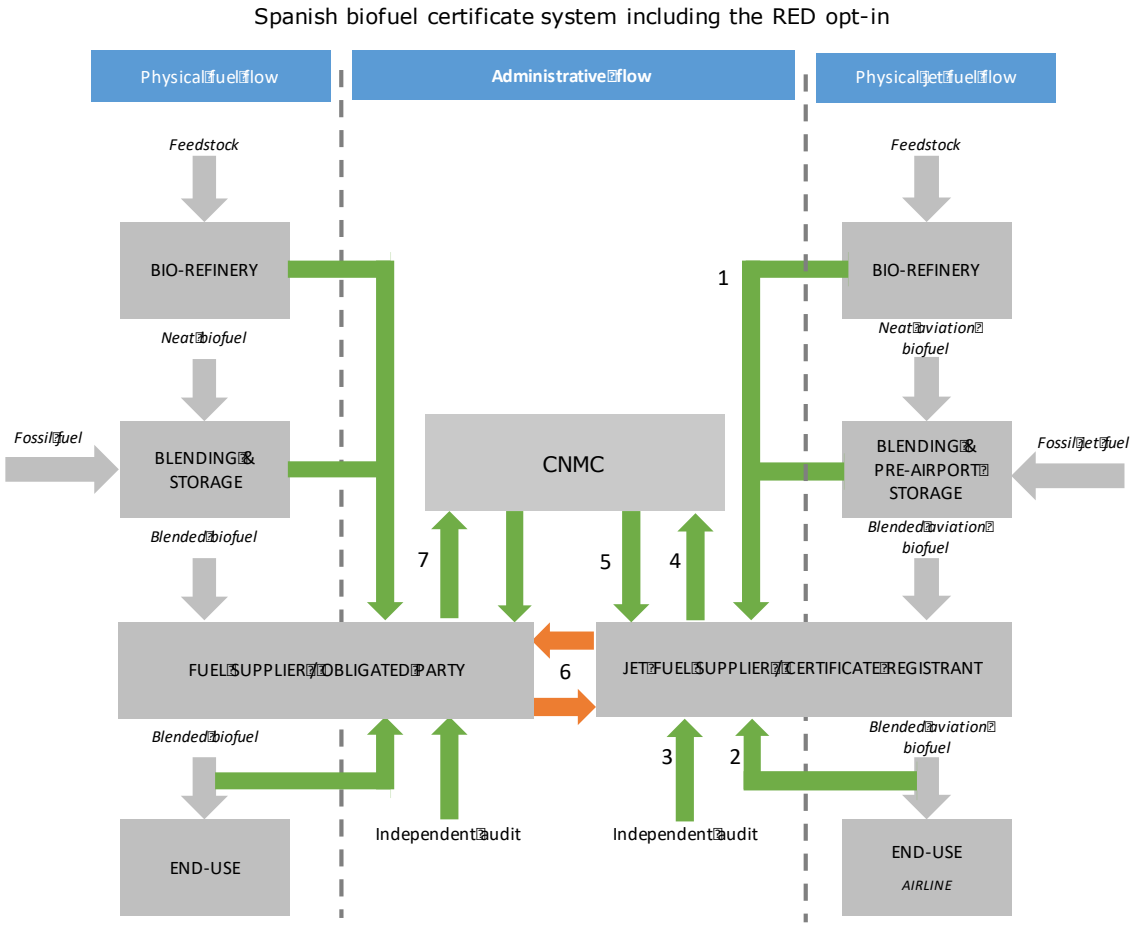

Figure 3. Hypothetical schematic representation of the Spanish certificate system including the aviation opt-in

1.2 RED aviation opt-in member state analysis – Portugal

1.2.1 Obligation for road transport

Portugal is working towards the renewable target for transport that builds up to 10% in 2020 as prescribed in the Renewable Energy Directive. To reach this target, Portugal obligated the market of distributors and importers of diesel and petrol, they reached a share of 5.3% in 2010, but dropped to 0.4% when sustainability criteria came into play. In 2014, Portugal is back on a 3.4% share of renewable energy sources in the transport sector. Still behind on the targets for reaching the 10% share in 2020.

ILUC amendment

Almost all biofuel activity is based on first generation biodiesel in Portugal. As Portugal also has a large farming sector, they were relatively opposed to any significant limitations on first generation biofuels. This resulted in a negative view on the ILUC amendment. However, now the ILUC legislation is accepted by the EU, Portugal needs to change their legislation accordingly. Portugal is currently working with the responsible ministries; Ministry of economic, Ministry of Environment and Ministry of Agriculture, Forestry and Rural Development, the Entidade Nacional Para O Mercado de Combustiveis (ENMC) and the Directorate General for Energy and Geology (DGEG) on the renewed ILUC implementation, this is open for input from the industry in the summer of 2016. Legislation will be implemented in 2017.

1.2.2 Certificate system

ILUC Implementation timeline		
Public consultation period	Final legislation	Implementation
Summer 2016	End 2016	2017

The obligation set out in Portugal is controlled with a certificate system. Obligated parties can prove their compliance with the biofuel obligation by having biofuel certificates; so called: Titulo de biocombustivels (TdBs).

The obligated parties entail “all entities that incorporate fuels on the market for end consumption for the road transport sector”.

The Entidade Nacional Para O Mercado de Combustiveis (ENMC) is responsible for managing and controlling the system of obligation, including the trading of certificates. The ENMC is an independent (semi-public) organisation that is responsible for “the use of biofuels promotion, encouraging the greenhouse gases emissions reduction and contributing to the energy supply security reinforcement in Portugal.”

The Directorate General for Energy and Geology (DGEG), was previously responsible for the entire certificate system, ENMC has taken most of its role now. However, DGEG is still involved with the smaller producers (PPD) as the certificates generated by these parties (approximately 3% of the total) are auctioned to obligated parties. A final entity in the certificate system is the Entity Compliance Coordinator of Sustainability Criteria (ECS), which is part of the ENMC, is the body responsible for verification of the sustainability criteria and issues the certificates.

In Figure 4 the certificate system is shown graphically. Interesting to note from the Portuguese system is that the producer of the biofuel, i.e. the bio-refinery is the place where TdBs are generated. This in contrast with e.g. the Dutch system where there is no fixed place of certificate registration. In the following this system is discussed more specifically:

1. The producer of the biofuel hands over documents proving the sustainability of the biofuel and feedstock it is made from. This information is send to ENMC, who checks it.
2. ENMC checks the documents and issues a TdB with the biofuel, when double counting is applicable the respectable number of TdBs are issued.
3. The TdBs are moving alongside the fuel to the fuel supplier.
4. The obligated party proves that the fuels are put on the final transport market, and therewith the obligated party fulfils their mandate.

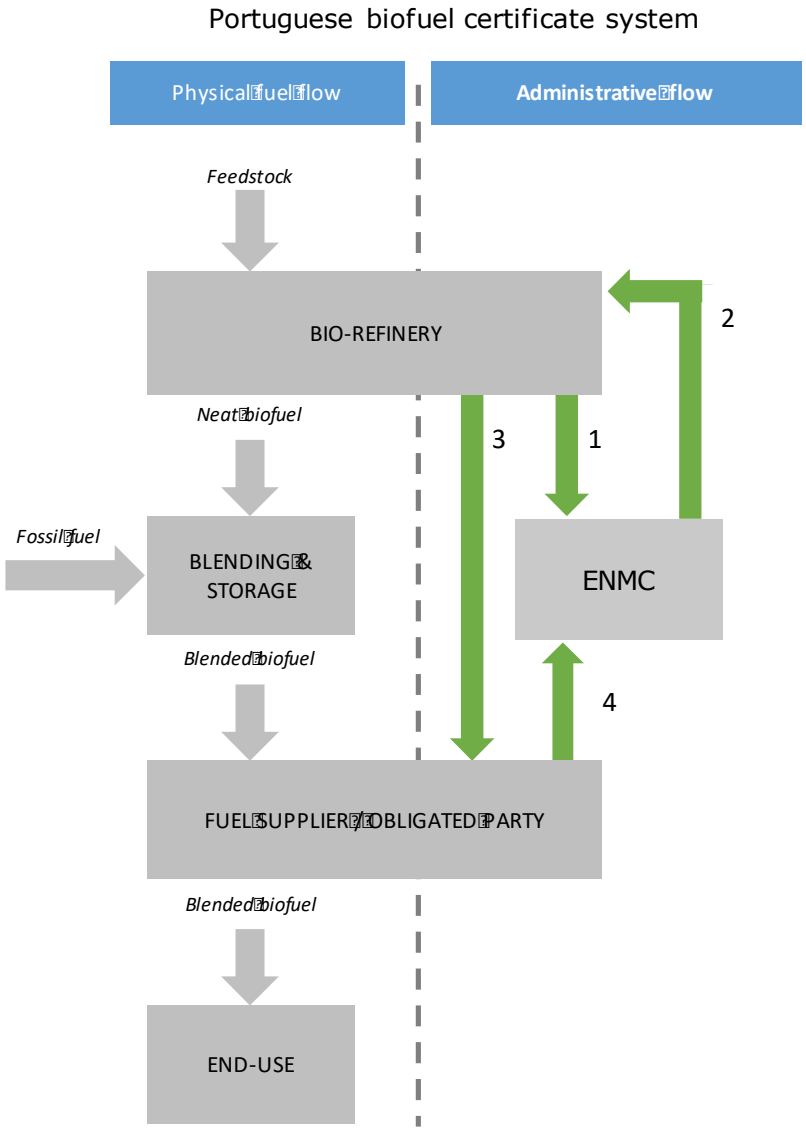

Figure 4. Schematic overview of the road transport biofuel certificate system in Portugal

Sustainability criteria

The sustainability criteria are in line with the Renewable Energy Directives sustainability criteria:

- To be considered sustainable, biofuels must achieve greenhouse gas savings of at least 35% in 2016, 50% in 2017 50% and 60% in 2018. All life cycle emissions are taken into account when calculating greenhouse gas savings. This includes emissions from cultivation, processing, and transport (i.e. the full supply-chain).

- Biofuels cannot be grown in areas converted from land with previously high carbon stock such as wetlands or forests.
- Biofuels cannot be produced from raw materials obtained from land with high biodiversity such as primary forests or highly biodiverse grasslands.

These Green House Gas reduction is checked in the entire supply chain. The proof of compliance of the GHG criteria is checked by using a mass balance system. The Land Use criteria is only checked for the feedstock which needs to be provided by the biofuel producer. As was shown in Figure 4.

Value

The value of 1 TdB is one tonne of oil equivalent (toe) of biofuel put on the market. Three types of TdBs can be distinguished, these TdBs are all worth the same value, this also ensures that TdBs can be traded amongst and count to all obligated parties. In other words: a gasoline obligation can be fulfilled with TdB-O's.

- TdB-G correspond to a TdB issued for a gasoline substitute biofuel.
- TdB-D correspond to a TdB issued for a diesel substitute biofuel.
- TdB-O correspond to a TdB issued for another fuel substitute biofuel.

In the case of raw materials (waste or debris) used in the production of biofuels 2 TdBs instead of 1, are issued per Toe of biofuels put on the market. This also holds for biofuels produced with non-food cellulosic material or lignocellulosic material. Unique in Portugal are the extra TdBs for biofuels produced from domestic non-food raw materials. These receive 1.3 TdB per Toe produced. Each Toe of biofuel produced out of domestic agricultural raw materials is granted with 1.1 TdB. As this is national legislation, the EC does not recognize these extra TdBs. Therefore, the extra TdBs received from domestic raw materials is just valid at the domestic level and cannot be reported to the EC as part of the national obligation.

A compensation fine does exist when the obligated party does not deliver the prove of compliance with the obligated target. The height of the fine is not fixed and depends on the seriousness of the offense and can range from € 2.500 to € 44.891. The 'income' from these fines are distributed for 70% to the Portuguese Carbon Fund and 30% to the Energy Efficiency Fund.

Trading certificates

When an obligated party does not want to / can not produce biofuels themselves, it is possible to buy certificates from another obligated party who has too many or from an independent biofuel producer. The certificates can be freely traded under the supervision of the ENMC, which registers transfers of certificates from one entity to another. There is no formally organised secondary market, thus transfers are arranged among organisations trough bilateral negotiations or through economic agents who obtain large amounts and sell them to obligated parties. This enables obligated organisations to fulfil their obligation by buying certificates instead of producing biofuels themselves.

Certificates can be transferred to the next year, without any cap. However, tickets are only valid for two years. So no long-term banking is possible.

1.2.3 Stakeholders

The stakeholders are discussed in three categories, first the responsible governmental organisations are discussed, followed by the biofuel industry. The last discussed category is the airline industry. Figure 5 shows the overview of stakeholders, this is followed by an thorough description of the stakeholders.

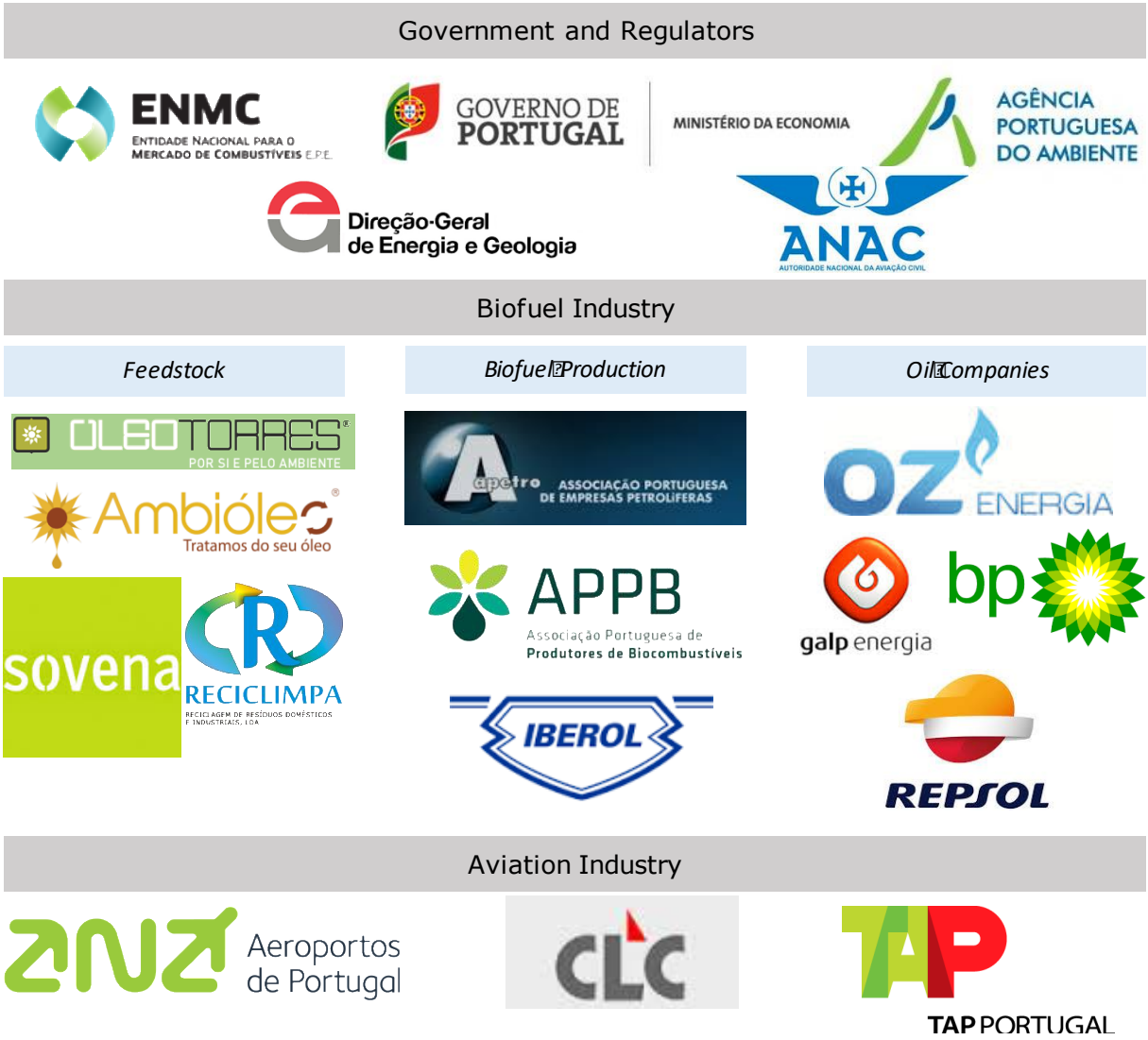

Figure 5. Stakeholder overview Portuguese biofuel industry.

Government and Regulators

- Ministry of Economy – Responsible for economic regulations and the body under which ENMC operates.
- Entidade Nacional Para O Mercado de Combustiveis (ENMC) - The national authority for the fuel market, this organisation is the regulator for fossil fuels and biofuels. In this role the ENMC is also responsible for the TdB System.
- Entity Compliance Coordinator of Sustainability Criteria (ECS) – Entity which is directly connected to the ENMC, responsible for checking sustainability compliance and the issuing of certificates.
- Directorate General for Energy and Geology (DGEG) – The licensing energy authority, including biofuels, responsible for setting the obligations and checking whether the obligated parties complied with their obligations.
- Ministry of Agriculture, Forestry and Rural Development – Involved in the ILUC implementation and in general the closest ministry to the legislation.
- Ministry of Environment – Together with the ministry of agriculture close to ILUC implementation, also responsible for the emission trading scheme.
- Portuguese Environment Agency (APA) – Could be a key contact with knowledge on legislation, Carbon Funds etc.

- Trade & Investment Agency of Portugal (AICEP) – As an independent organisation a lot of knowledge on the fuel and aviation side to help get access for foreign companies, like SkyNRG, to get in touch with the right stakeholders
- Civil Aviation Authority (ANAC) – The aviation authority responsible for aviation airport legislation, noise control, environmental legislation, etc.

Biofuel Industry

Feedstock

The Portuguese biofuel sector mainly consists of biodiesel production. This biodiesel production is heavily reliant on imported raw materials. Domestic oilseeds production comes down to olive oil and sunflower oil, both of them being primarily intended for the food market.

The Portuguese biofuel industry is trying to increase domestic and local production of raw materials in order to reduce the country's dependency on imported feedstock. The feasibility of this possibility, especially regarding the first generation fuels has been questioned regularly.

The deficit in domestic oil production for the biodiesel is compensated by imports of oils (palm oil, soybean oil or other Vegetable oils) or oilseeds (mainly rapeseed and soybean) to be crushed in the country. Soybeans have been the biggest feedstock in the past, however nowadays rapeseed is the dominant feedstock.

In Portugal, the big feedstock processors are Sovena and Iberol, owning the majority of the crushing capacity.

On the advanced feedstock side, there are some organisations that gather Used Cooking Oil (UCO) for biodiesel production in Portugal.

- Oleotorres – Uses used cooking oil to make biodiesel, fats as well as candles and other products
- Ambióleo – UCO gatherer and refining to biodiesel and other industrial products.
- Reciclimpa – Is gathering UCO by cleaning customers, restaurant fryers or large vegetable oil containers.

Biofuel production industry

- Associacao Portuguesa de Produtores de Biocombustiveis (APPB) – Organisation for the biodiesel producers, as an organisation they are the spokesman for the entire sector. Also they try to lobby around the government and spread information about biodiesel in general to inform the public.
- Associacao Portuguesa de Empresas Petroliferas (APETRO) – This organisation represents all Portuguese oil companies, including both the large ones, Cepsa, BP, Petrogal and smaller OZ Energy and de Rubis. APETRO is seen as a very important partner in the decision-making process with regards to the oil sector.

Oil Companies

- Galp Energia – Oil Company also refining jet fuel, biggest supplier of jet fuel.
- Prio Energy – Oil company with a biodiesel plant, first to use UCO as a feedstock in Portugal.
- Repsol (Bio-ETBE) – Oil company with bioethanol and biodiesel activities also activities to develop jatropha and algae.
- OZ Energia – New oil player jet-fuel included Lisboa, Porto e Faro
- Iberol – Oil company and owner of biodiesel plant

Aviation Industry

Airports and Logistics

- ANA Group – Association under which all airports of Portugal are united; integrated in the French VINCI Airports Group.
- CLC - Companhia Logística de Combustíveis S.A. – Manages the only oil products pipeline in Portugal (65% Galp, 15% BP Portugal, S. A., 15% Repsol Portuguesa, S. A. e 5% Rubis Energia Portugal, S. A)
- Takargo Railcargo **–** The rail cargo organisation responsible for the transport of jet-fuel from Sines transported until Loulé by rail operated by Takargo (Mota-Engil),

Airlines

- TAP Portugal – Tap is the local airline based on Lisbon Portela Airport
- SATA Azores – Portuguese airline for the Azores region.

1.2.4 Possible voluntary opportunity to include Jet Fuel

The Portuguese system is slightly different to the Dutch blueprint, as the certificates are generated at the producer. This does not mean it is impossible to implement the aviation RED opt-in. Figure 6 shows how the opt-in could be implemented. The following steps take place when a TdB is generated with SAF.

1. The bio-refinery can generate the ticket similarly to the road transport situation. First the bio-refinery provides the needed sustainability documents to the ENMC.
2. The ENMC checks the sustainability and issues the certificates
3. The ticket is useless for the jet fuel supplier, as he is not obligated. Therefore, the ticket can be sold to the road fuel supplier, who is obligated under the RED
4. The obligated party hands over the TdBs to the ENMC to fulfil the obligation

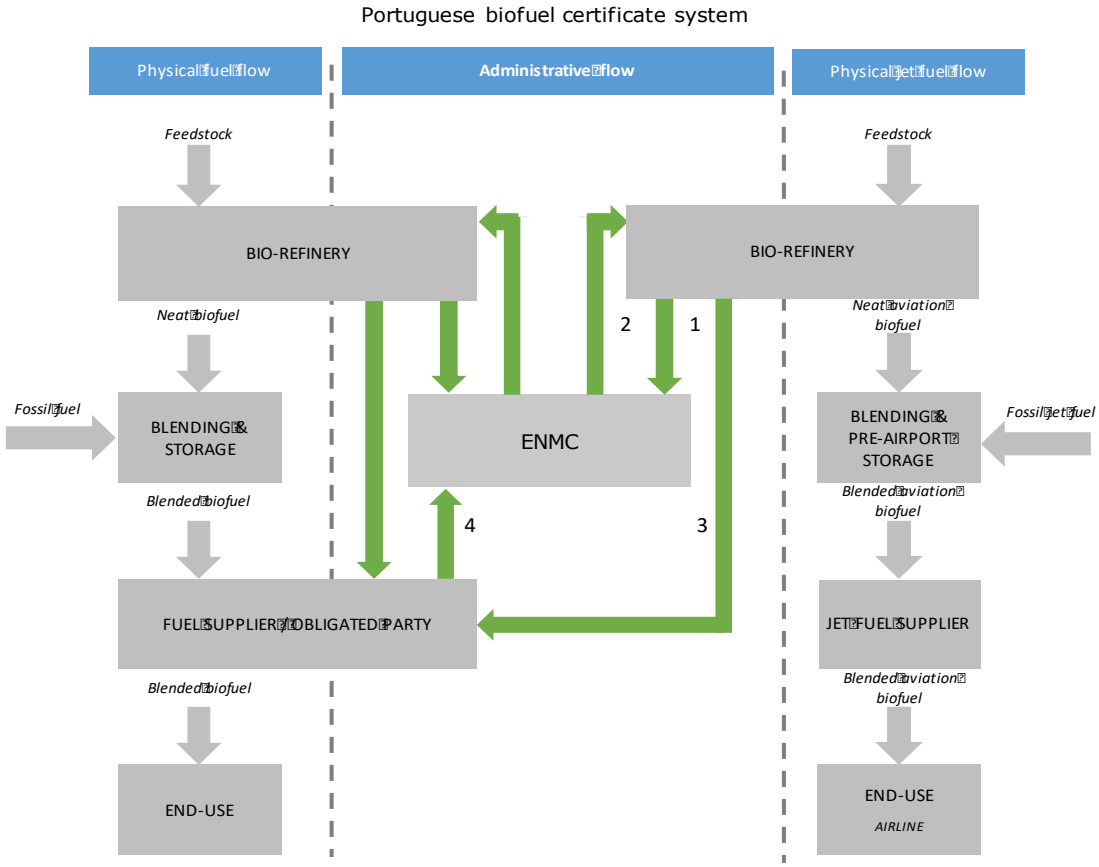

Figure 6. Hypothetical schematic representation of the Portuguese certificate system including the aviation opt-in

1.3 RED aviation opt-in member state analysis – Ireland

1.3.1 Obligation for road transport

Ireland has as many other countries obligated the distributors and importers of diesel and petrol to reach the 10% renewable energy share target in 2020. Since 1st January 2013, the biofuel obligation has been increased to 6 litres in every 100 litres. This ratio equates to 6.4% of petroleum-based motor fuel placed on the market. In 2014, Ireland reached 5.2% which shows that Ireland is slightly behind their RED implementation schedule.

ILUC amendment

Ireland is as other countries working towards an inclusion of the ILUC legislation. The National Oil Reserves Agency (NORA) is the organisation responsible for the administration of the Energy (Biofuel Obligation and Miscellaneous Provisions) Act 2010. The NORA is an independent statutory body created under the Department for Communications, Energy & Natural Resources. Currently there is no indication that Ireland is working on the ILUC implementation and the only public consultation period that is announced, is 'planned for 2016'

1.3.2 Certificate system

ILUC Implementation timeline		
Public consultation period	Final legislation	Implementation
'Planned for 2016'	Unclear	2017

Ireland previously had a Mineral Oil Tax Relief Scheme (MOTR) in place to stimulate biofuels. Since 2011 this system is replaced by a certificate system known as the Biofuel Obligation Scheme (BOS). This certificate scheme is in place to control whether the obligated parties fulfil their obligation.

The parties obligated under the RED legislation in Ireland are *"all oil companies and oil consumer liable to pay the NORA Levy".* In other words: the party that puts the petroleum fuel on the market carries the Biofuel Obligation.

The NORA is responsible to administer this system. NORA has engaged consultants (a consortium of Byrne Ó Cléirigh and LHM Casey McGrath – with BÓC as the lead consultant – hereinafter referred to as BÓC-CMG) to administer the Scheme. SiAs for the Dutch system, it is not important how many BOS certificates are generated by the party but it is the number of BOS certificates held in each party's account at the end of the year which determines whether the obligation is met. The obligation period is the calendar year so runs from the first of January – 31st of December. NORA automatically opens a 'biofuel obligation account' for each obliged party to manage the issuance, transference and cancellation of biofuels certificates. A producer or supplier of fuels that is not obligated might also open an account, this party has to request this. Such accounts need to be accompanied by a tax clearance certificate.

The certificate system is shown graphically in Figure 7, in the following a more detailed explanation on this system is provided. The certificate registrant can either be the producer or supplier of the biofuels. The same rules apply for both when registering for BOS certificates. Therefore, the figure shows a separate 'registrant', in reality this is either the 'bio-refinery' or the 'fuel supplier'.

1. The registrant has to show the sustainability of the entire supply-chain by filling in the UK Carbon Calculator.

2. An independent verification report is needed and should be obtained prior to registering for the BOS certificates.
3. Both the sustainability statements and verification report is handed over to NORA
4. In return the certificates are provided to the registrant.
5. If the registrant is the fuel supplier, he keeps them, as the fuel supplier is also the obligated party. If the BOS certificates are registered at the bio-refinery the certificates are sold with the fuel to the fuel supplier, who can then fulfil the obligation.
6. The obligated party shows, at the end of the year, the fulfilment of its obligation.

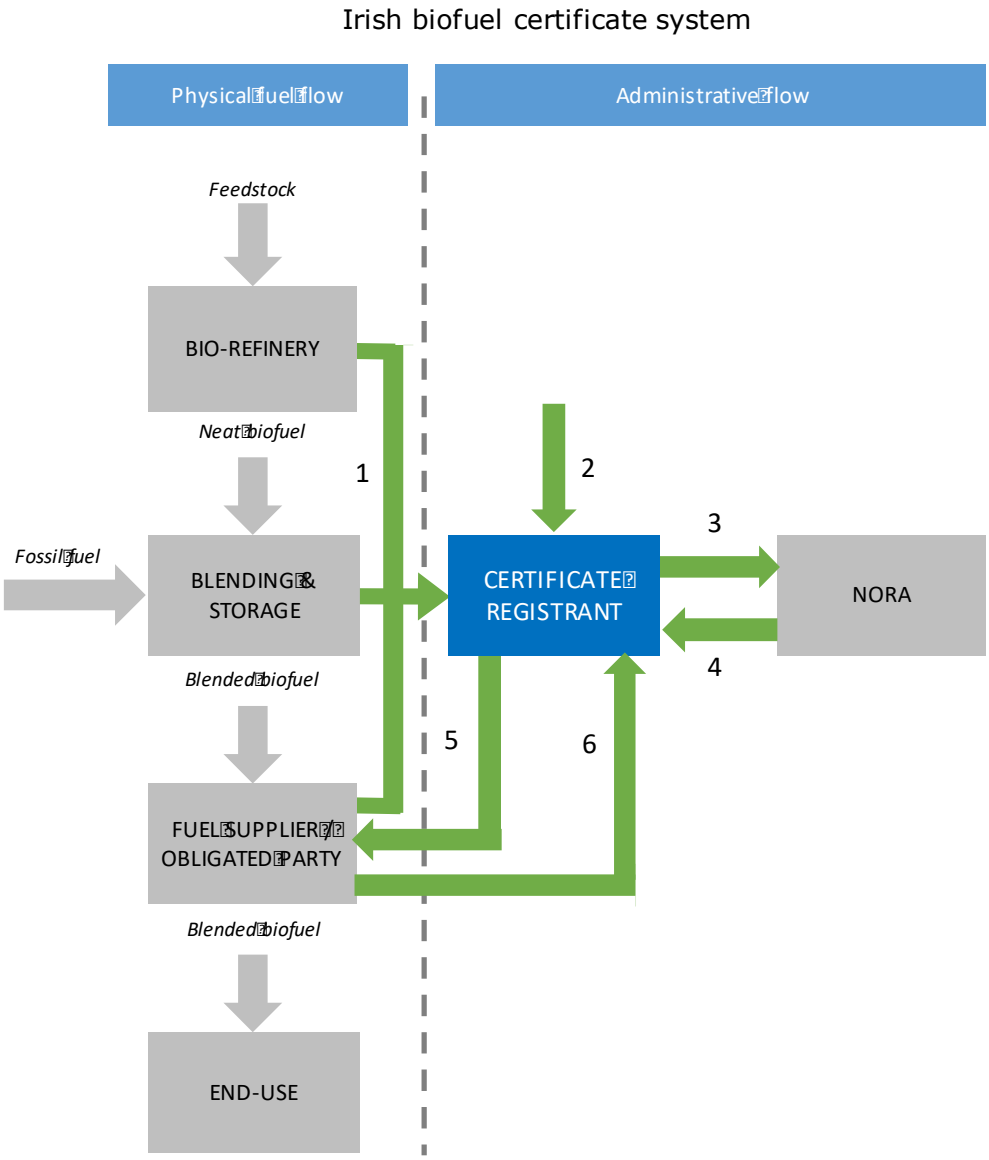

Figure 7. Schematic overview of the road transport biofuel certificate system in Ireland

Sustainability Criteria

In 2014 new sustainability criteria for biofuels are implemented by the Irish government in line with the Renewable Energy Directive's sustainability criteria.

- Green House Gas emission savings of biofuels in comparison with the fossil fuel baseline. These emission targets are increasing: Before 2016: 35%, 2017: 50% and 2018: 60%.

- Specific requirements based on the feedstock. Feedstock should not be obtained from land previously a primary forest, a nature protection area, highly biodiverse grasslands, wetland, peat land.

The GHG criterion is checked using a mass balance system, where the different feedstocks used for the biofuel production, are specified to determine the GHG savings. NORA further, accepts the sustainability criteria as prescribed by the RED. These criteria are as strict as prescribed in either:

- Compliance with any national scheme developed by a competent authority.
- A bilateral or multilateral agreement concluded by the EC with a third country, referred to in the RED.
- A voluntary national or international scheme recognised by the EC under the RED.

Value

A BOS certificate is issued for every litre of biofuel. There is no distinction for biofuels produced as diesel or ethanol. All certificates are considered the same and can be traded among different categories.

Two BOS certificates will be issued for every litre of biofuel when they are produced from biodegradable waste, residue, non-food cellulosic material, ligno-cellulosic material or algae. In such cases, prior to issuing the double-counted certificates, NORA is obliged to consult with EPA, NSAI, SEAI and the Minister for Environment, Heritage and Local Government to ensure that the stricter sustainability regulations for these feedstocks are met.

A compensation fine exists when the obligated party does not deliver the prove of compliance with the obligated target. The fine for not having the right amount of certificates at the end of the year, is currently € 0,45 per litre.

Trading Certificates

The trading of certificates is a commercial matte between the buyer and the seller in Ireland. The BOS certificates can be transferred between BOS account holders, independently of the biofuel. To make it easier for buyers, NORA issues quarterly statements of accounts. As the trading works as a bilateral agreement between the parties, the price will be market driven. This enables obligated organisations to fulfil their obligation by buying certificates instead of producing biofuels themselves.

An interesting note compared to other member states' system is that certificates cannot be traded until the end of the year. Therefore, it's impossible to know how much the certificates will be worth until the end of the year. This might be the reason that local biodiesel production has decreased since the BOS system replaced the MOTR system. As large fuel distributors choose to pay the low fine for the buy-out instead of buying the certificates from other parties.

Obligated parties are allowed to fulfil up to 25% of their mandate with certificates of the previous year.

1.3.3 Stakeholders

The stakeholders are discussed in three categories, first the responsible governmental organisations are discussed, followed by the biofuel industry. The last discussed category is the airline industry. In Figure 8, an overview of the relevant stakeholders is provided.

Figure 8. Stakeholder overview of the Irish biofuel industry

Government and Regulators

- Department for Communications, Energy & Natural Resources (DCENR) – Governmental ministry responsible for energy and oil legislation, NORA operates under this department.
- Department of Transport, Tourism and Sport (DTTAS) – Has the task of transposing the biofuel directive, a.o. the ILUC directive.
- National Oil Reserves Agency (NORA) – Manages conventional oils, as well as the administrator of the BOS system, regulating the certificates and controlling the obligated bodies.
- Sustainable Energy Authority of Ireland (SEAI) – Ireland's national energy authority under the sustainability Energy Act 2002. SEAI is a governmental organisation to develop Ireland's low carbon and energy efficiency activities.

Biofuel Industry

Feedstock

The Irish biofuel production industry is small. The biodiesel production that is taking place locally is done with mainly oilseeds, tallow and used cooking oil (UCO). There are a number of collectors and distributors of UCO in Ireland:

- Frylite – Waste oil collector and distributor of vegetable oils to restaurants in Ireland.
- MT Oils – Waste oil collector who transports all their UCO to the Green Biofuels Ireland biodiesel facility.

Irish agricultural is expensive; *Irish Biofuels* claim: "It is the intention of the Company to import raw material (a.o. used cooking oil) from suppliers throughout Europe." It is also stated in a

report of the department of agriculture that feedstock prices are high, infrastructure is inadequate and importing B99 biodiesel is very cheap in Ireland, resulting in a low demand for local biodiesel production and its feedstock.

Biofuel production industry

- Irish Bioenergy Association (IrBEA) – Organisation to promote bioenergy industry in Ireland. IrBEA represents all stakeholders from the Bioenergy sector. Affiliated to AEBIOM, the European Biomass Association.
- Green Biofuels Ireland Ltd. – 30.000 tonnes per year facility in New Ross. Leading Biodiesel facility in Ireland, from only waste feedstocks: UCO and animal fats.
- Irish Biofuels Production Ltd. – 20.000 tonnes per year facility in Wicklow Port. Producing biodiesel from various feedstocks, mainly UCO.

Oil Companies

The traditional oil industry is small in Ireland, there is only one relatively small refinery operated by Phillips 66 in Cork, Ireland.

- Petrogas – Focus on oil distribution through filling stations in Ireland and the UK.
- San Leon Energy – Oil and gas exploration company and leading in Europe on Shale gas exploration.

Aviation Industry

Airlines

- Aer Lingus – Oldest airline headquartered in Dublin, limited sustainability goals.
- Ryanair – Budget airline, has a pure cost focus and no sustainability goals.
-

Airports and Logistics

No oil pipelines exist and transport of oil products Is by road and rail. Local refineries are mainly located in the south, near Cork. Dublin airport is mainly supplied by ship and rail.

- Dublin Airport – 19 million passengers a year, stated owned airport under the DAA

1.3.4 How could the opt-in work?

The system in Ireland is very similar to the Dutch blueprint, as either the producer or supplier of the fuel can be the registrant. The certificate system is shown graphically in Figure 9, on the left side the existing road transport system is shown and on the right side the possible jet fuel flow is shown. The certificate registrant can either be the producer or supplier of the biofuels. The same rules apply for both when registering for BOS certificates. Therefore, the figure shows a separate ‘registrant’ in reality this is either the ‘bio-refinery’ or the ‘fuel supplier’.

1. The registrant shows the sustainability of the entire supply-chain by filling in the UK Carbon Calculator.
2. An independent verification report is needed and should be obtained prior to registering for the BOS certificates.
3. Both the sustainability statements and verification audit report are handed over to NORA when applying for the BOS certificates.
4. In return the certificates are provided to the registrant.
5. As the certificate registrant on the jet fuel side is not obligated, the BOS certificates are sold to the obligated party in the form of the road transport supplier.
6. This obligated party hands over the certificates to NORA at the end of the year, and therewith fulfils its obligation.

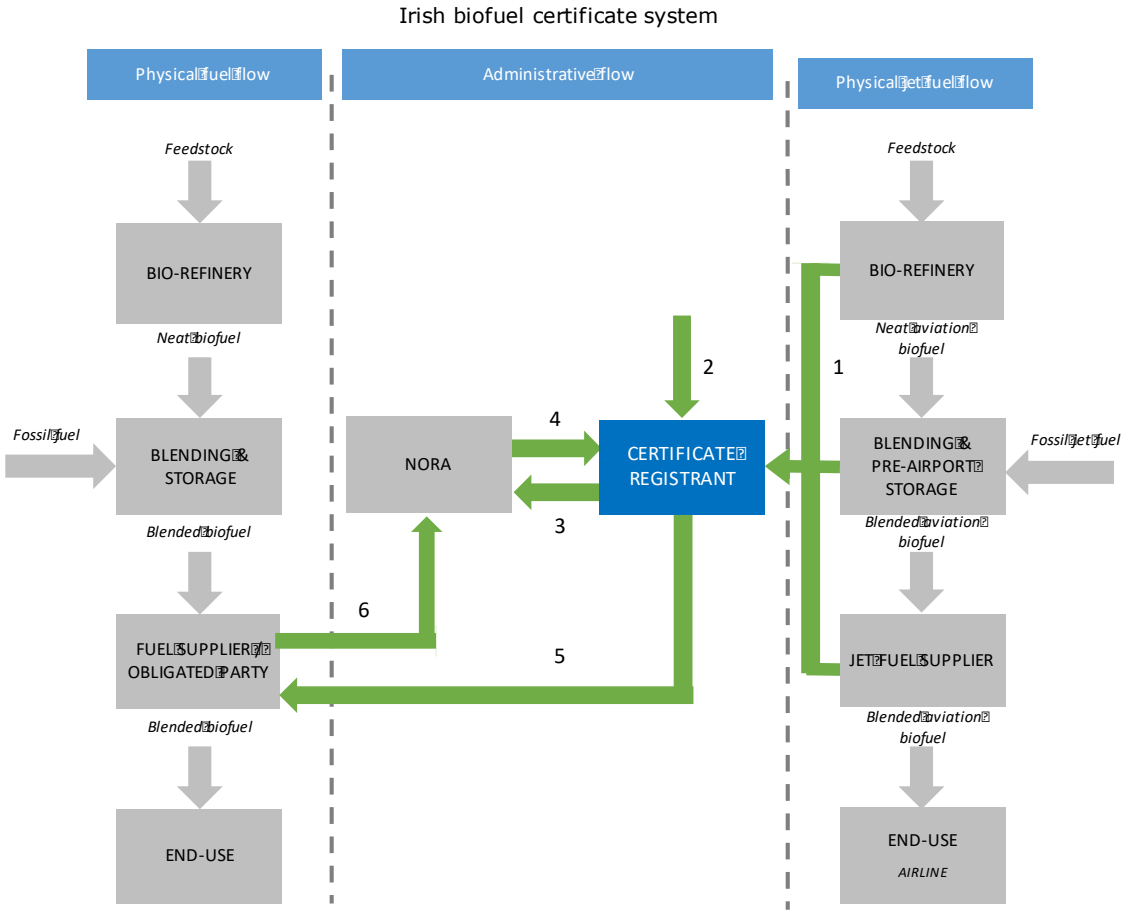

Figure 9. Hypothetical schematic representation of the Irish certificate system including the aviation opt-in

1.4 RED aviation opt-in member state analysis – Italy

1.4.1 Obligation for road transport

Italy transposed RED Directive by means of the Legislative Decree no. 28 of 3 March 2011, according to which renewable sources are expected to cover 17% of gross final energy consumption in 2020 and at least 10% of final energy consumption *in transport*. Moreover, according to the Decree, as from 1st January 2012, biofuels used in transport and bioliquids and those used for the production of electricity will be counted for the achievement of the 10% national targets and will have access to support schemes only if they meet the sustainability criteria set out in the implementing measures of Directive 2009/30/EC of 23 April 2009 (Art. 38, comma 1)[1].

The GSE (Gestore Servizi Eneregetici)[2] accredited by the MISE (Ministry for Economic Development) issues the certificates on an annual basis. Italy has currently reached a 4.5% use of renewable use in transport, a little behind schedule the 10% goal by 2020. Moreover, in November 2014, Italy became the first EU MS to mandate the use of advanced biofuels. In fact, an advanced biofuels blending mandate, for waste and non-food feed stocks biofuels, at 0.6% by 2018 and 1% by 2022, made Italy the first EU country to set a legally binding mandate for advanced biofuels. From January 2018 gasoline and diesel shall contain at least 1.2% advanced biofuel, rising to 1.6% by 2020, and 2% by 2022.

ILUC Implementation

A public consultation in which the aviation opt-in could be suggested, takes place in June – July. As Italy was the first to mandate the use of advanced biofuels in the EU, their interest in new decarbonisation opportunities is large.

ILUC Implementation timeline	
Public consultation period	Expected Implementation
June-July 2016	December 2016

1.4.2 Certificate System

The Italian government has combined two instruments to support biofuels: 1) a tax reduction (excise reduction) and 2) a trading system of biofuel certificates (CICs).

1) The first measure was aimed at reducing the final cost of biofuels. It was a total exemption in 1995 and it became a reduction of excise in 2006 for 250 thousand tons until 2009. The reduction of the excise duty has been changed by Law 191/2009 which assigns 18 thousand tons of biodiesel to be distributed among biodiesel plants. This measure ended on December 31, 2010 (Adele Finco & Franco Angeli 2013).
2) Obligated subjects can also fulfil the obligation buying the so-called biofuel emmission certificates ("Certificati di Immissione in Consumo" - CICs). GSE, accredited by the MISE (Ministry for Economic Development) issues these certificates on an annual basis. Each certificate verifies that 10 Gcal of biofuels have been made available for consumption. The certificates are tradable, so it is possible for those liable for the obligation to make biofuel available to fulfil the legal obligation by buying certificates from other parties who have too many. The certificates are traded through bilateral negotiations and subsequent notification to the MIPAAF certification system.

[1] See: Art. 38. Criteri di sostenibilità per i biocarburanti e i bioliquidi – Sustainability criteria for biofuels and bioliquids.

[2] GSE: Gestore dei Servizi Energetici S.p.A. is the state-owned company that promotes and supports renewable energy sources in Italy.

-

According to the National Renewable Energy Action Plan, the intention for the future is to take action mainly through the obligatory minimum quota, in line with the sustainability criteria and the development of second and third generation biofuels.

The obligated subjects (OSs), namely the parties who release for consumption gasoline and diesel to be used for motor transport, have to mix them with a well-established amount of sustainable biofuels. Both economic bodies as well as fuel suppliers are obligated under the mandate. Economic bodies are defined as those subjects based in the EU or in a third country that provide (either free of charge or under payment) feed stocks, intermediate products, waste and/or other materials and fuels for the production of biofuels and bioliquids to be marketed in the EU. The obligation, until 2013, was calculated on the basis of the calorific value of the fossil fuels released in the previous year, while from 2014 is based on the fossil fuels released in the current year.

This system of certificates is shown in Figure 10, the verification of the sustainability criteria for biofuels and bioliquids is ensured through a system of traceability throughout the supply-chain (flow 1). As from January 2012, the economic operators of the production chain of biofuels and bioliquids, whether they are produced in EU and in third countries, who intend to join this system, must be subject to initial and periodic audits by certification bodies accredited by the single certification body, ACCREDIA, through its certification and inspection department (flow 2). Both the proof of sustainability and the check of accredia are provided to the GSE (flow 3). Consequently, the GSE issue the CICs to the obligated party (flow 4). The obligated party shows on its turn the CICs at the end of the obligation period to the GSE and therewith fulfils its obligation (flow 5).

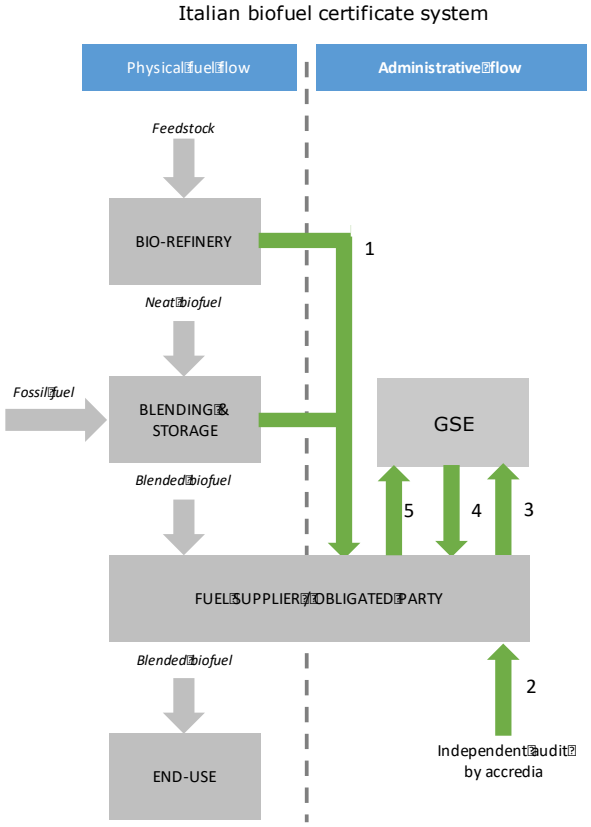

Figure 10. Schematic overview of the road transport biofuel certificate system in Italy

Sustainability criteria

These criteria relate to the nature of the land where the feedstock is grown and are aimed at preventing direct land-use change of areas of high carbon stock and high biodiversity value for the production of biofuels, as well as setting minimum greenhouse gas emission savings compared to fossil fuels.

To verify compliance with the sustainability criteria, all parties involved in the production chain of the biofuel must adhere either to:

- the National System of Certification of Sustainability (Decree of the Ministry for the Environment, Land and Sea of 23 January 2012); or
- a voluntary system (as set out in article Art. 7b Directive 2015/1513 amending FQD (98/70/EC) and the RED (2009/28/EC); or
- Bi-lateral or multilateral agreement concluded by the European Union with third countries and recognized by the European Commission (van Grinsven & Kampman (20165).
-
- As from 2012, a biofuel must comply with the following sustainability criteria, in order to be granted financial subsidies:
- Reduction of GHG emissions – the entire supply chain and consumption of biofuels (from the feedstock to the final users) must guarantee a reduction in the GHG emissions in comparison with the use of fossil fuels. This reduction must at least amount to 35% (as of 2013 for biofuels produced in factories operational since 2008). The reduction-level will rise to 50% in 2017 and 60% as from 2018 (for biofuels produced in factories operational as from 2017).
- Feedstock materials must not be derived from lands which have high biodiversity value or lands with high carbon stock.
- If the feedstock materials are produced in the EU, they must comply with the standards set out in Regulation 73/2009/CE as regards agricultural and environmental conditions.
- Biofuels derived from waste other than agricultural/fishery/forestry must comply with the first criteria listed above.

Value

The price of a CIC in 2013 was about 400/450 €. A double-counting provision is in place. According to Legislative Decree No 28/2011 transposing Directive 2009/28/EC, parties who demonstrate that they have released for consumption biofuels produced from waste and waste by-products, algae and materials of non-food origin including cellulosic and ligno-cellulosic material shall be entitled to a certificate of release for consumption once they have released a quantity of 5 Gcal (rather than 10 Gcal) of such biofuels. Such release for consumption can thus be deemed to count twice the release for consumption of other biofuels.

No buy out price is in place in Italy but a compensation fine applies when the obligated party does not deliver the certificate of compliance with the obligated target. Failure to fulfil the obligation by the Obligated Subjects implies the payment of a penalty of a value between 600 and 900 €/CIC depending on the extent of the failure.

Trading certificates

In fulfilling their obligation, liable parties can purchase CICs from parties with certificates surplus to their own requirements. To fulfil the requirement, the Obligated Parties can, therefore, enter into biofuel consumption or purchase CICs from Parties with a higher number than in their obligations. For this purpose, the GSE has created a specific platform (BIOCAR) through which operators can exchange certificates. Verification procedures are carried out on a periodical basis. The validity of the certificate is of 1 year.

1.4.3 Stakeholders

Government and regulations

- In Italy the competence for the ILUC Directive, amending Directive 98/70/EC (FQD) and Directive 2009/28/EC (RED), is split between the Ministry for the Environment Land and Sea and the Ministry of Economic Development (both under the coordination of the Executive).

Biofuel Industry

Feedstock

The most commonly used feedstock for aviation biofuels in Italy is palm oil. The renewable sources mostly used are mainly based on biofuels (biodiesel, biomethane, bioethanol, ETBE36), either pure or blended with fossil fuels. The feedstocks used for the 2nd generation biofuel chain are above all the lignocellulose ones. M&G/Chemtex in Italy is building the largest world lignocellulosic plant in Crescentino (Vercelli, Piedmont Region) based on the proprietary innovative *PROESA*™ technology (a new research center fully devoted to this technology has been established and operated since 2008)

Oil major Eni has recently launched a diesel blend containing 15% vol. of hydrotreated vegetable oils (HVO) as a Renewable Diesel Fuel produced at its Porto Marghera plant. The product, *Eni Diesel +,* is to be available at 3,500 stations nationwide.

Biofuel Industry

- Enel Group dedicated to developing and managing energy generation from renewable sources at the international level.
- Biofuels Italia - Italian Biofuels Technology Platform of the Bologna University aimed at fostering a network of public and private stakeholders able to accelerate and implement the response to the needs of society and consumers in the biofuel field in Italy, fostering the transfer of knowledge and innovation to the industrial world.
- ENEA – Italian National Agency for new Technologies which focuses on second-generation biofuels such as lingo-cellulosic materials such as, respectively, gasification into hydrogen and carbon oxide, and the fermentation of carbohydrates into ethanol, as well as the production of hydrogen from fermentation of humid biomass and biofuels from microalgae cultures.
- ENI - Ente Nazionale Idrocarburi engaged in oil and natural gas exploration, field development and production, as well as in the supply, trading and shipping of natural gas, LNG, electricity, fuels and chemical products. Through refineries and chemical plants, ENI processes crude oil and other oil-based feedstock to produce fuels, lubricants and chemical products that are supplied to wholesalers or through retail networks or distributors.

Aviation Industry

- The main stakeholder is Alitalia, Italy's largest airline company.
- ENAV is an Italian company owned by the Ministry of Economy and Finances and managed by the Ministry of Infrastructure and Transport, through ENAC, the Italian Civil Aviation Authority.
- Another relevant stakeholder is ISAFF (Italian Sustainable Aviation Fuel Forum) - established in June 2013 thanks to the cooperation between ENAC, the Italian Civil Aviation Authority and WEC Italy (the Italian Committee of World Energy Council, a no profit international, multi-energy organization recognized by the UN as global energy body). The Forum is open to Italian energy and aviation stakeholders and aims at including European players as well. Its members include airlines, industry and governmental institutions as well as public and private research organizations. ISAFF acts as a platform for collecting, exchanging and discussing relevant information related to energy and complementary areas in aviation.

Key Projects

- Beta Renewables whose key mission is technological innovation, in order to promote the PROESA™ technology for the production of 2nd generation biofuels and biochemicals, with the goal of fast and large-scale deployment of its applications on the market. Moreover, it manages the plant in Crescentino (Vercelli, Italy), the first commercial facility in the world for the production of second-generation ethanol.
- Biochemtex is a global leader in the development and engineering of technologies and bio-chemical processes based on the exclusive use of non-food biomass, as an alternative to oil.
- Thanks to a partnership with Beta Renewables– it realizes technologies and plants to produce bio-ethanol and other chemical intermediates.
- CRB Italian Biomass Research Centre, a new research centre sponsored by the Italian Ministry of Environment and Territory at the University of Perugia. CRB is the Italian reference Centre for research on biofuels and biomass for energy.
- Beta Renewables commercial scale cellulosic ethanol plant at Crescentino (COMETHA (2014-2018), supported by FP7, involves the construction and operation of an integrated industrial facility for the production of second generation bioethanol and other co-products from lignocellulosic feedstock.
- Eni announced plans to convert its Venice refinery into a "green refinery" to produce HVO, using the Ecofining™ process developed with Honeywell-UOP.

1.4.4 Possible voluntary aviation opt-in

The aviation opt-in can be implemented in the RED system. A possible implementation could look like the schematic representation in Figure 11.

1. The verification of the sustainability criteria for biofuels and is ensured through a system of traceability throughout the supply-chain this information should be gathered by the registrant.
2. As from January 2012, the economic operators of the production chain of biofuels and bioliquids, whether they are produced in EU and in third countries, who intend to join this system, must be subject to initial and periodic audits by certification bodies accredited by the single certification body, ACCREDIA, through its certification and inspection department.
3. Both the proof of sustainability and the check of ACCREDIA are provided to the GSE.
4. Consequently, the GSE issue the CICs to the registrant/jet fuel supplier.
5. As the jet fuel supplier does not need the CICs, they trade them to the obligated party on the road fuel side, in return they receive the monetary value of the certificate and therewith cover part of the price premium.
6. The obligated party shows on its turn the CICs at the end of the obligation period to the GSE and therewith fulfils its obligation.

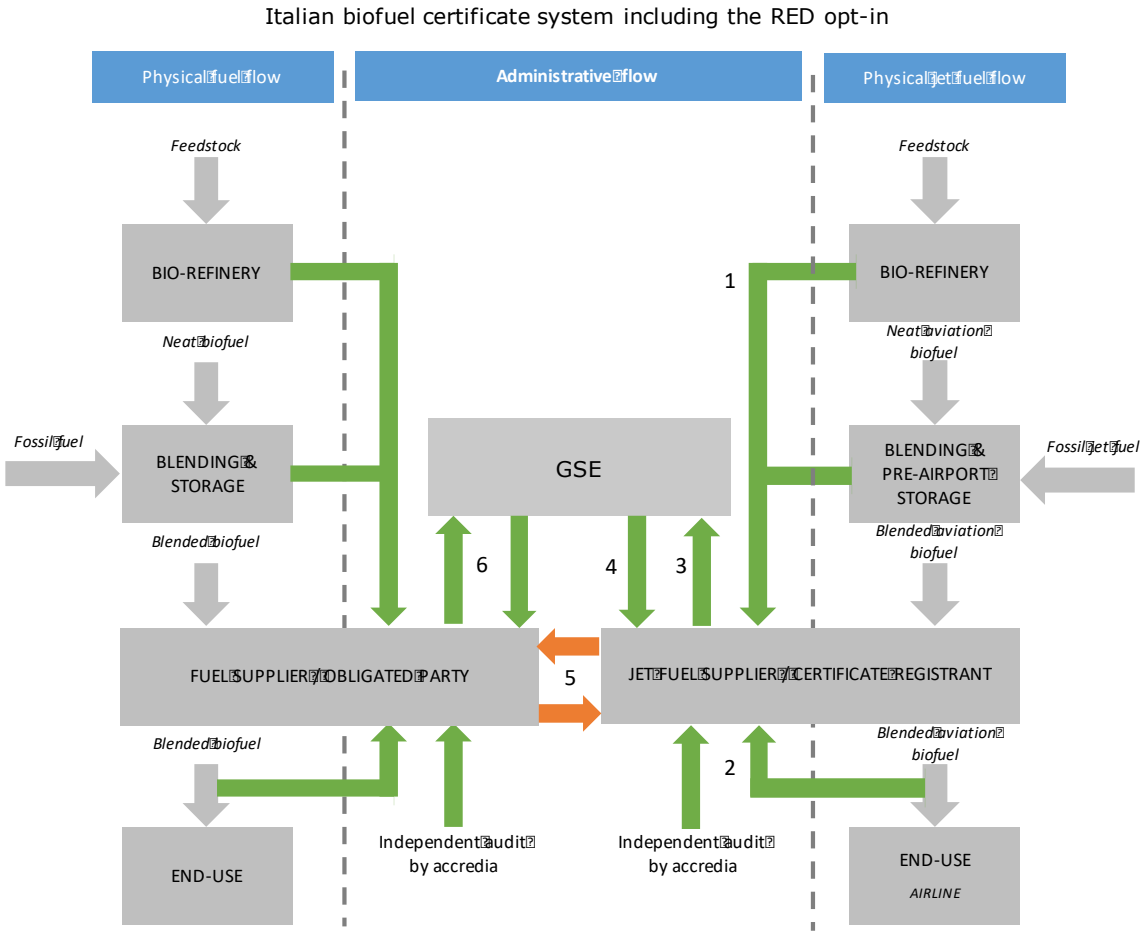

Figure 11. Hypothetical schematic representation of the Italian certificate system including the aviation opt-in

1.5 RED aviation opt-in member state analysis – United Kingdom

1.5.1 Obligation for road transport

The RED sets a target that 10% of energy used in transport must come from renewable sources by 2020. A significant proportion of this target is expected to be met through the supply of sustainable biofuels. The UK's Government seeks to reduce the greenhouse gas emissions from the transport sector as part of its wider aim of addressing climate change. The Renewable Transport Fuel Obligation (RTFO) scheme is a legal instrument that encourages reductions in greenhouse gas emissions in the UK by substituting some of the fossil fuels used in road transport and gas oil used in non-road mobile machinery[3]. In particular, obligated suppliers are those who supply more than 450,000 litres per year of road transport and non-road mobile machinery fuel. The RTFO came into force on 15 April 2008 and included voluntary sustainability targets.

On 15 December 2011 the RTFO was amended in order to transpose the transport elements of the RED into UK legislation. The most significant change was the introduction of mandatory sustainability criteria for biofuels in the UK and the introduction of *double counting* for biofuels derived from wastes and residues. The current criteria include a requirement for suppliers to show that their biofuels deliver greenhouse gas reductions of 35% against the equivalent fossil fuel, rising to 50% in January 2017. In addition, the cultivation of biofuel feed-stocks should not cause loss of carbon stocks or biodiversity.
Biofuels that do not meet the sustainability criteria will be treated as fossil fuel under the scheme. The RTFO scheme was amended from 15 April 2015 to increase the reward for certain renewable gaseous transport fuels, to align the treatment of hydrotreated vegetable oil (HVO) and fatty-acid-methyl-ester (FAME), and to clarify the approach to rounding of RTFCs and fuel volumes.

Aviation biofuels currently do not take part in the RTFO system. Therefore, sustainable aviation, founded in 2005 to bring together major UK airlines, airports, manufacturers and air navigation service providers, has been advocating for suppliers of sustainable aviation fuel to have an opt-in option to the RTFO. Moreover, sustainable aviation contributed to the 2015 Transport Energy Task Force last year launched by the UK government which looked at future policy options for transport fuels and will participate in the formal public consultation on future RTFO legislation in summer 2016 launched by the government which will probably include aviation and addressing the issue of ILUC.

ILUC Implementation timeline	
Public consultation period	Expected Implementation
June-July 2016	December 2016

1.5.2 Certificate System

The RTFO operates on an annual basis starting each year on 15 April. Each supplier of fuel to the UK market[4] is required to demonstrate that biofuel has been supplied to cover a set proportion of their overall fuel supply. For the 2014-15 year, this proportion was set at 4.8%.
Suppliers can meet this obligation either:
by redeeming certificates that they have received for their own biofuel supply, or
by redeeming certificates that they have bought from other suppliers of biofuel.

[3] In additional to fuels used in road transport, the RTFO covers liquid fuel used in non-road mobile machinery, agricultural and forestry tractors, inland waterway vessel and recreational craft when not at sea.

[4] Except those supplying less than 450,000 litres per year.

The RTFO operates with tradable certificates. These are called Renewable Transport Fuel Certificates (RTFCs) and are awarded to suppliers of sustainable biofuel. RTFCs are issued by the RTFO Administrator on a monthly cycle and applications for RTFCs received after the cut-off date will be processed the following month. The last possible date for RTFC applications to be received is 14 August.

The system of issuing certificates is shown in Figure 12. The system is very comparable to the Italian and Spanish system.

- The biofuel suppliers must provide evidence that their fuel meets the sustainability requirements.
- All suppliers (whether obligated or non-obligated) wishing to apply for RTFCs for their biofuels must report independently verified information the sustainability of their biofuels to the RTFO Administrator; this verification must be carried out by a competent party according to the International Standard on Assurance Engagements (ISAE 3000)
- Both obligated and non-obligated suppliers who wish to claim RTFCs are required to report all fuel volumes together with the gathered sustainability information to the RTFO.
- If the sustainability criteria and independent verification are approved the RTFO issues the RTFCs to the obligated party.
- The obligated party can at the end of the obligation period hand in their certificates and therewith fulfil the obligation.

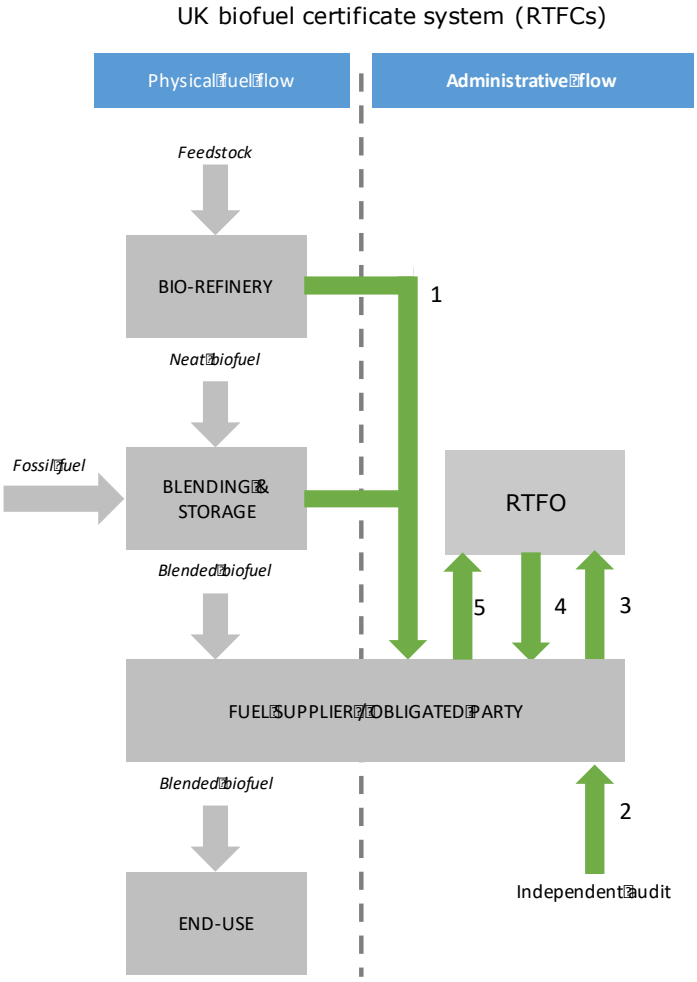

Figure 12. Schematic overview of the road transport biofuel certificate system in the UK

Sustainability Criteria

As regards the sustainability criteria for the obligated parties these entail the RED and FQD sustainability standards. The RED and FQD have set mandatory minimum requirements on the following elements:

- **Greenhouse gas (GHG) emissions savings (Article 17(2))**: Biofuels must achieve at least a 35% GHG emissions saving, increasing to at least 50% from 1 January 2017.
- **NUTS2 (Article 19(3))**: For EU crop-based feed-stocks, parties are only allowed to use the RED GHG default values if the feed-stock is from a region where the typical GHG emissions from cultivation of agricultural raw materials can be expected to be lower than or equal to the disaggregated default value for that raw material (set out in Annex V.D of the RED). Regions are defined at the NUTS2 level. Member State reports on emissions from cultivation are published on the European Commission Transparency Platform10. Note that revised NUTS2 codes (NUTS2013) have come into effect from 1 January 2015.
- **Biodiversity (Article 17(3))**: Biofuels may not be made from raw material obtained from land with high biodiversity value at any point during or since January 2008. The European Union adopted a Regulation on the definition of highly biodiverse grasslands on 8 December 2014, which applies from 1 October 2015.
- **Carbon stock and peatlands (Articles 17(4) and 17(5))**: Biofuels may not be made from raw material obtained from land with high carbon stock or land that was undrained peatland in January 2008 unless strict criteria are met.
- **Cross compliance (Article 17(6))**: Biofuel feed-stocks grown in the European Community must be cultivated according to the European Commission's 'Cross Compliance' requirements (point A and row 9 of the table in Annex II to Council Regulation (EC) No 73/2009 of 19 January 2009) and the minimum requirements for good agricultural and environmental condition (see Article 6 of the same Regulation).

Value

Biofuels have historically been more expensive than fossil fuels. Fuel suppliers/retailers are likely to pass much or all of these additional costs onto the final consumer. Biofuels also have lower energy content per litre, so the use of biofuels increases the cost of motoring.
The UK Department of Transport estimated the cost imposed by the RTFO using monthly volumes of biofuels as reported through the RTFO statistics.

A double-counting system is in place. Under the RED, biofuels derived from wastes, residues, non-food cellulosic material, and ligno-cellulosic material are double counted towards Member States' renewable transport targets and towards suppliers' obligations. This means that one litre of biofuel produced from wastes/residues will receive two RTFCs[5].
Biofuels from non-food cellulosic and ligno-cellulosic materials such as Miscanthus and woodchips are also double counted. This is to encourage better biofuels that are more sustainable. Biofuels from feed-stocks that are eligible for double counting receive double the number of RTFCs per litre (or kilogram in the case of biogas) as their single counting equivalents. Biofuels from wastes and residues (with the exception of agricultural, aquacultural, fisheries[6] and forestry residues) will also be considered to have automatically met the land use criteria required by the RED and FQD.

[5] For biogas produced from feed-stocks that are wastes, residues, ligno-cellulosic or non-food cellulosic materials, the number of certificates will be doubled to 3.8 and 3.5 RTFCs per kilogram of biomethane and biobutane or biopropane (or a combination of both biobutane and biopropane) respectively.

[6] In many cases materials from aquaculture and fisheries will automatically meet the land based criteria because these materials are not usually sourced from the land. However, suppliers should check with the Administrator which criteria must be demonstrated on a case by case basis.

RTFCs may be bought or sold on the open market. RTFCs have a maximum buy-out price of 30p/litre, but currently they are trading at less than this. Any money received from suppliers buying out is distributed between suppliers who have redeemed RTFCs and those who have chosen to surrender additional RTFCs for this purpose.

Trading Certificates

Obligated suppliers have multiple options of getting their certificates, as certificates can be traded amongst parties:

- supplying a certain percentage of sustainable renewable transport fuel;
- purchasing certificates from other companies supplying renewable fuel;
- combination of any of the above.

Moreover, fuel suppliers can meet up to 25% of their obligation with certificates issued in previous year. This reduces the impact of unexpected events and provides some protection against year to year volatility of fuel prices.

1.5.3 Stakeholders

Government and Regulations

The Secretary of State for Transport is required by HM Treasury direction, as an imputed tax and spend measure, to prepare an annual report in respect of the RTFO scheme established under the Renewable Transport Fuel Obligations Order 2007 (as amended). Moreover, the Department of Energy and Climate Change DECC and the Department of Transport, Low Carbon Fuels provide support for developing Government policy on low-carbon transport fuels.

Biofuel Industry

Feedstock

In the early years of the RTFO, there was a high proportion of crop-based feed-stocks. Taking into account the risk of ILUC from these crops, the total GHG savings for these years was low and was even negative during the first year. Since 2011, when an additional incentive for biofuels from waste-based feed-stocks was introduced, approximately half of UK biofuels have been made from waste. These feed-stocks reduce the risk of ILUC and therefore give higher net GHG savings.

The figure below shows the main feed-stocks from which the UK's biofuels were made in 2014-15. Waste feed-stocks, which have a reduced risk of undesirable impacts, are shown in bold, and represent 50% of biofuels supplied.

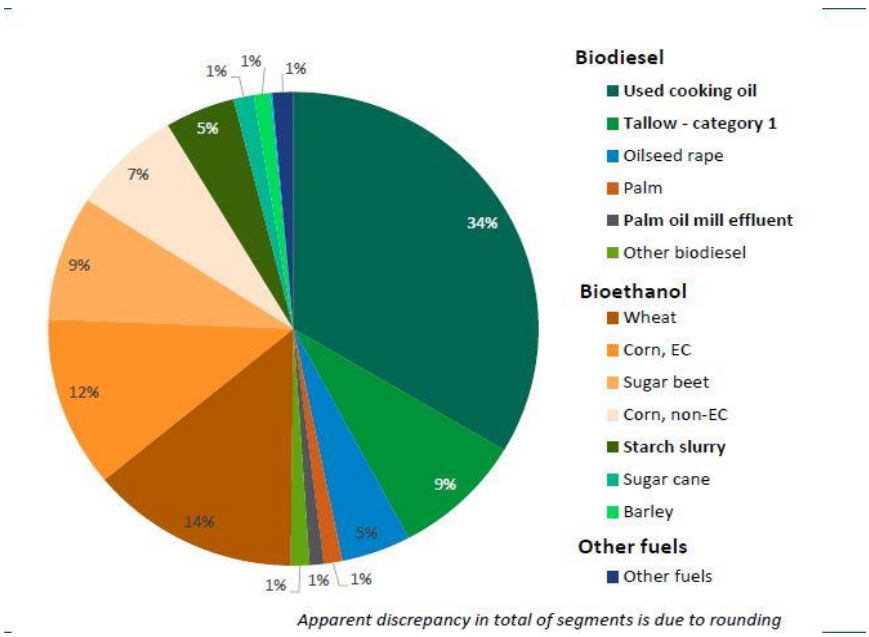

Figure 13. Feedstocks for UK Biofuels in 2014-2015

The RTFO requires road transport fuel suppliers to blend a certain amount of biofuels into fossil fuels. The most significant biofuels deployed through this mechanism are bioethanol (48%), which is blended into fossil petrol and biodiesel (50%), which is blended into fossil diesel.
As to the types of advanced biofuels foreseen, it is important to look at both new feed-stocks and new biofuels technology. The long term need is mainly for advanced biofuels for aviation (biokerosene) and HDV (biodiesel).

Biofuel production industry

Oil&Gas UK, a not-for-profit organisation, established in April 2007, is the leading representative body for the UK offshore oil and gas industry.
Green Fuels, founded in 2003, manufactures and commissions biodiesel processing equipment to produce high quality biodiesel.

Aviation Industry

- *British Airways*, the national airline. Since its merge with Iberia, it became Europe's third largest scheduled airline.
- *BP / DuPont Butamax™ technology* in 2009, BP and DuPont announced the formation of Kingston Research Ltd and the establishment of a £25 million advanced biofuels research center in Hull for demonstration of biobutanol technology.
- *Green Biologics* has developed Butafuel™ technology, and is coordinator of the Horizon 2020 project ButaNext (2015 - 2018).
- *University of Greenwich, UK,* announced it is leading a 4-year €10 million project supported by EC FP7 to develop the microalga *Dunaliella* as a sustainable raw material that captures carbon dioxide and can grow in some of the world's harshest environment. The project will build a biorefinery called the 'D-Factory'.
- *Sustainable Aviation* which was founded in 2005 to bring together major UK airlines, airports, manufacturers and air navigation service providers

Possible voluntary opportunity to include Jet Fuel

The system as was shown in Figure 12 can be extended with possible SAF production. When SAF suppliers start to claim certificates under the voluntary aviation opt-in. The system could look like Figure 14. The first part is very similar to the road fuel side.

1. The biofuel suppliers must provide evidence that their fuel meets the sustainability requirements.
2. The supplier wishing to apply for RTFCs for their biofuels must report independently verified information on the sustainability of their biofuels to the RTFO Administrator; this verification must be carried out by a competent party according to the International Standard on Assurance Engagements (ISAE 3000).
3. Both obligated and non-obligated suppliers who wish to claim RTFCs are required to report all fuel volumes together with the gathered sustainability information to the RTFO.
4. If the sustainability criteria and independent verification are approved the RTFO issues the RTFCs to the obligated party.
5. As the SAF supplier does not have to keep the certificates, they can trade them with the road transport fuel obligated parties. The obligated party can on its turn, at the end of the obligation period hand in their certificates and therewith fulfil the obligation.

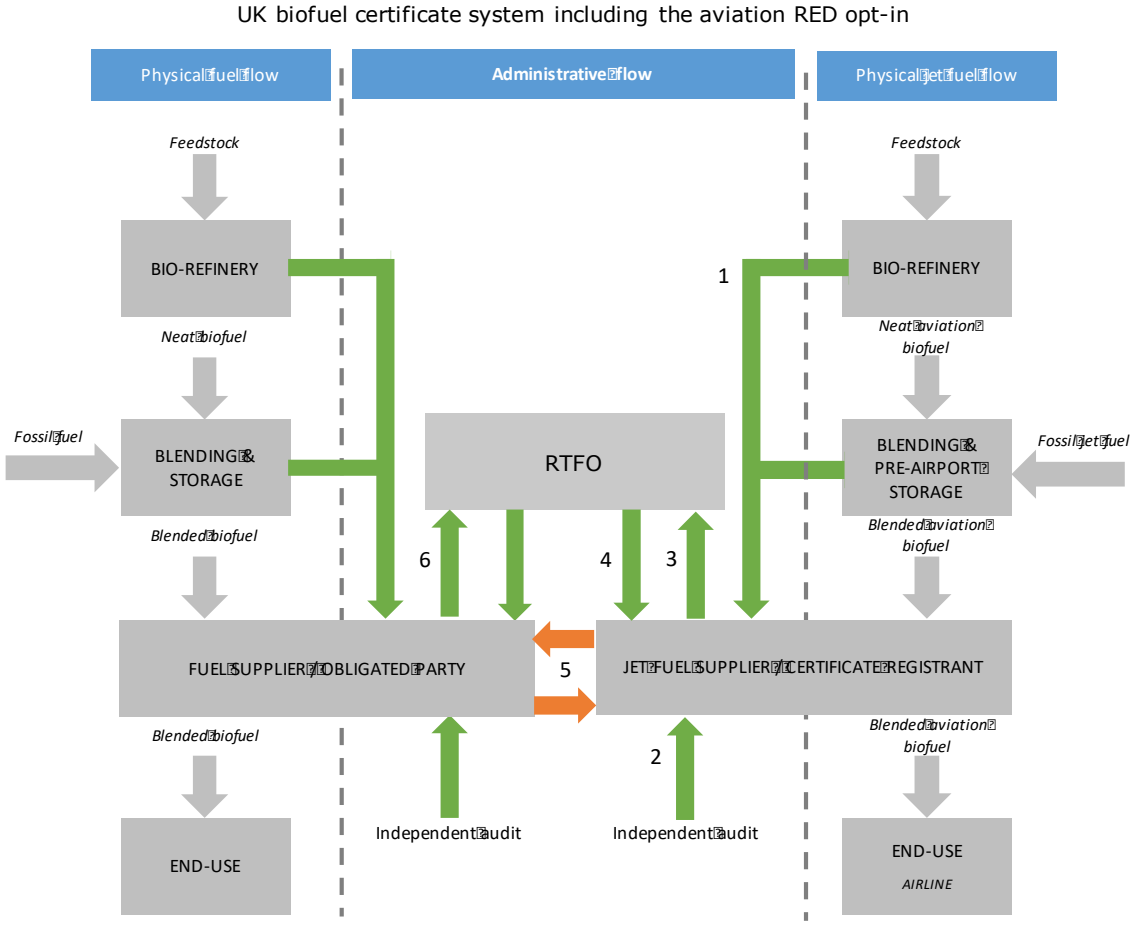

Figure 14. Hypothetical schematic representation of the United Kingdom's certificate system including the aviation opt-in

1.6 Progress report other high potential member states

In this section for each of the other high potential member states a short progress report of the local situation is provided including involvement of industry and governmental organisations. The potential of the aviation opt-in and the results of this report are discussed during the SAFUG meeting, 15-03-2016 hosted by SkyNRG and Boeing. An update of the project is shared with Boeing, Airport and IATA.

Belgium

No specific participation with the Belgium government apart from local Boeing representatives who were involved in the update call. These contacts will try and push for renewed legislation in Belgium.

Relevant partners
Annalisa Monaco – Boeing
Darrin Morgan - Boeing

France

A first analysis on France has been done to investigate the France situation, there is not a compatible certificate system. Therefore no further in-depth involvement has taken place. However, as france is the country in which Airbus is head quartered, local Airbus representatives will push for RED aviation opt-in legislation in their country.

Relevant partners
Frederic Eychenne – Airbus
Thierry Nowaczyk – Airbus

Germany

SkyNRG is asked to participate in a discussion with the national parliament, to discuss and present the opportunities of the RED aviation opt-in. At this moment these discussions are on hold until the government will decide on legislative changes. SkyNRG is kept in the loop for these new developments and will support the local industry with the efforts to include the aviation opt-in in the future.

Relevant partners
Thomas Roetger – IATA
Melanie Form - AIREG
Johannes Roper – Boeing

Sweden

Sweden is involved in the ITAKA project, where fuel has been delivered to Oslo airport. Also SkyNRG has developed the Fly Green Fund together with a.o.: Karlstad Airport, SAS and Swedavia. This fund helps to create the market for sustainable aviation fuels. Furthermore, it enables an easier local discussion about implementing the RED aviation opt-in in Sweden.

Relevant Partners
Maria Fiskerud – Fly Green Fund / SkyNRG

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Conducted by Maarten van Dijk and Francisco Telles, SkyNRG

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Portugal

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Conducted by Maarten van Dijk, Oskar Meijerink and Francisco Telles, SkyNRG

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Italy

Interview

- David Chiaramonti Professor of Renewable Energy Systems at the University of Florence, Italy. Specialized in Renewable Energies (mainly bioenergy/biofuels, wind and small hydro power) and Innovative Energy Technologies.

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